



## **Roller Coaster Standards**

### **Kindergarten**

#### **Physical Sciences**

##### Forces and Motion

4. Explore that things can be made to move in many different ways such as straight, zigzag, up and down, round and round, back and forth, or fast or slow.
5. Investigate ways to change how something is moving (e.g., push, pull)

#### **Scientific Inquiry**

##### Doing Scientific Inquiry

1. Ask "what if" questions.
2. Explore and pursue student-generated "what if" questions.

#### **Scientific Ways of Knowing**

##### Science and Society

4. Demonstrate ways science is practiced by people everyday (children and adults.)

### **Grade One**

#### **Physical Sciences**

##### Forces and Motion

6. Investigate a variety of ways to make things move and what causes them to change speed, direction, and/or stop.

##### Nature of Energy

7. Explore how energy makes things work (e.g., batteries in a toy and electricity turning fan blades.)

#### **Scientific Inquiry**

##### Doing Scientific Inquiry

1. Ask "what happens when" questions.
2. Explore and pursue student-generated "what happens when" questions.

### **Grade Two**

#### **Scientific Inquiry**

1. Ask "how can I/we" questions.
2. Ask "how do you know" questions (not "why" questions) in appropriate situations and attempt to give reasonable answers when others ask questions.
3. Explore and pursue student-generated "how" questions.

### **Grade Three**

#### **Physical Sciences**

## Forces and Motion

1. Describe an object's position by locating it relative to another object or the background.
2. Describe an object's motion by tracing and measuring its position over time.
3. Identify contact/non contact forces that affect the motion of an object (e.g., gravity, magnetism, and collision.)
4. Predict the changes when an object experiences a force (e.g., a push or a pull, weight and friction.)

## Science and Technology

### Abilities To Do Technological Design

4. Use a simple design process to solve a problem (e.g., identify a problem, identify possible solutions, and design a solution.)
5. Describe possible solutions to a design problem (e.g., how to hold down paper in the wind.)

## Grade Seven

### Physical Sciences

#### Nature of Energy

1. Describe how an object can have potential energy due to its position or chemical composition and can have kinetic energy due to its motion.
4. Explain how energy can change forms but the total amount of energy remains constant.

## Grade Eight

### Physical Science

#### Forces and Motion

1. Describe how the change in position (motion) of an object is always judged and described in comparison to a reference point.
2. Explain that motion describes the change in the position an object (characterized by speed and direction) as time changes.
3. Explain that an unbalanced force acting on an object changes that object's speed and/or direction.

## Grade Nine

### Physical Sciences

#### Forces and Motion

22. Demonstrate that any object does not accelerate (remains at rest or maintains a constant speed and direction of motion) unless an unbalanced force acts upon it.
23. Explain the change in motion (acceleration) of an object. Demonstrate that acceleration is proportional to the net force acting on the object and inversely proportional to the mass of the object. ( $F=MA$ . Note that weight is the gravitational force on an object.)
24. Demonstrate that whenever one object exerts a force on another, an equal amount of force is exerted back on the first object.

25. Demonstrate the ways in which frictional forces constrain the motion of objects (e.g., a car traveling around a curve, a block on an inclined plane, a person running, an airplane in flight).